

Chapter 5

Using Overlay Keyboards

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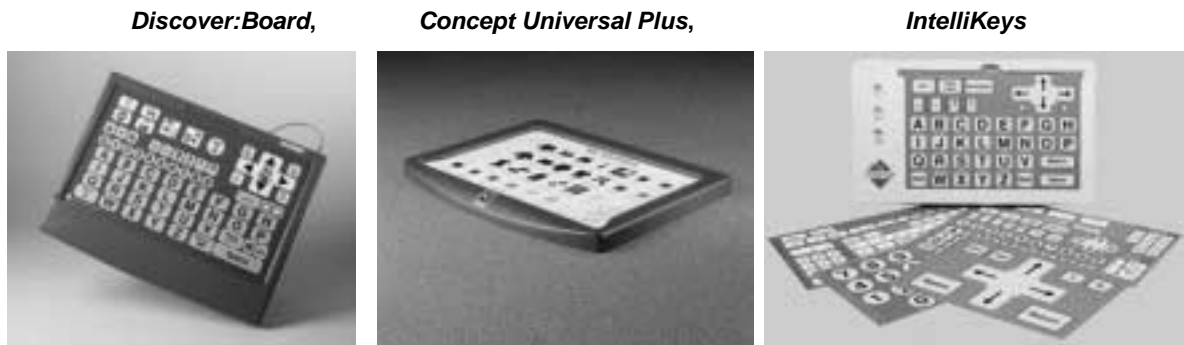
5.1 Introduction

An *overlay keyboard* is a shallow rectangular plastic or metal box, usually A4 or A3 size, with a flat top surface. The overlay keyboard plugs into the computer and it is used to operate it in place of the computer keyboard.

The overlay keyboard surface consists of a number (usually between 128 and 4096) of touch-sensitive keys. Individual keys, or groups of keys, may be programmed to:

- produce letters, words or phrases;
- emulate the action of pressing keys on the keyboard;
- move the mouse pointer;
- generate sound or speech;
- perform some other operation on the computer.

Figure 5-1 Overlay Keyboards



Paper or plastic overlays are placed on top of the keyboard to show the user which keys and areas have been programmed on the keyboard. The overlay can have text, symbols, photographs or objects – anything that reflects the action of the key(s) underneath in a way that is meaningful for the user. Figure 5-2 shows an overlay for *Discover:Board*. The overlay can generate letters, numbers and control keys; move the mouse pointer and click the mouse button; select blocks of text and then ‘cut’, ‘copy’ and ‘paste’; save to disc and print; spell-check the document; and speak out blocks of text. This particular overlay is North American: British schools would probably wish to modify it to use lower-case text.

Figure 5-2 Discover:Board overlay for Write Outloud talking word processor

										Save	Spelling abc ✓	Print
0	1	2	3	4	5	6	7	8	9			
A	B	C	D	E	A↓	A↑	Beginni...	End				
F	G	H	I	J	Tab	Re...						
K	L	M	N	O			Move	Select				
P	Q	R	S	T	Delete		→ abc.					
U	V	W	X	Y	,	?	Speak	Repeat				
Z	Shift	Return	Space	.	!							

Who Might Use an Overlay Keyboard?

The main advantage of overlay keyboards is that dedicated overlays can be tailored to suit the individual user and a particular task, thereby simplifying and improving access and control. Their use is not confined to special needs: overlay keyboards are used as input devices for retail, stock control and automatic cash machines – wherever a limited set of options needs to be presented.

Physical / Perceptual Difficulties

Pupils with **physical** or **perceptual** difficulties who find it hard to press the small keys on a standard keyboard may be able to use overlay keyboards with overlays designed to suit their particular needs. For example, the keys can be made different sizes, spaced further apart and arranged in a helpful layout, say with common keys grouped together.

Visual Impairment

Pupils with **visual impairment** may benefit from overlays created in high contrast colours (e.g. yellow on black); with large letter sizes; or clear space around each key.

Young and Early Learners

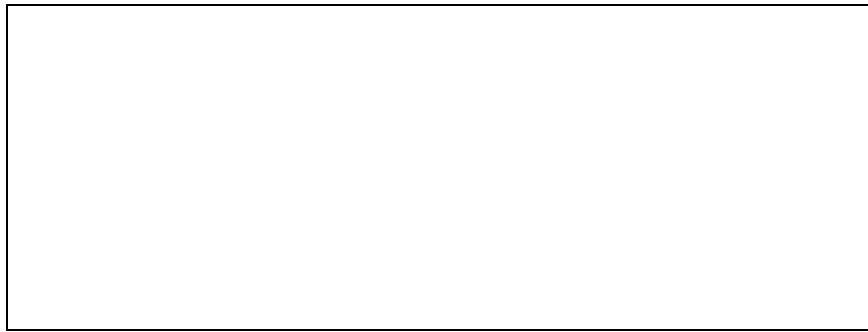
Young and early learners who are unfamiliar with the standard ‘QWERTY’ layout may find the full keyboard confusing. Overlay keyboards with keys printed in a lower case or ‘primary handwriting’ font or arranged in alphabetic order (Figure 5-3) may be simpler and easier to use.

Figure 5-3 *IntelliKeys* alphabetic layout



Overlays can be created with layouts and functions matched to the target application. For example, the *Discover:Board* overlay shown below can be used to control the mouse pointer for ‘point-and-click’ programs.

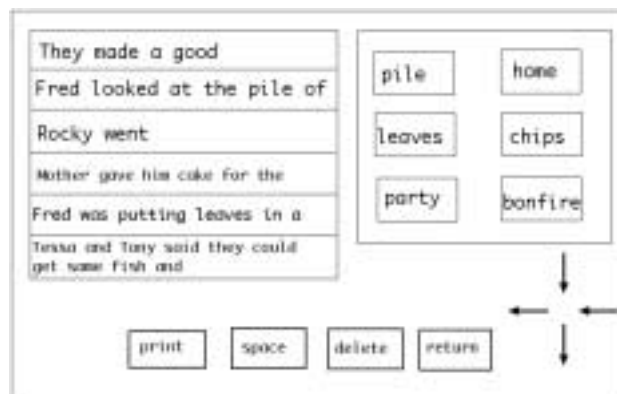
Figure 5-4 *Discover:Board* Mouse control overlay



Reading Difficulties

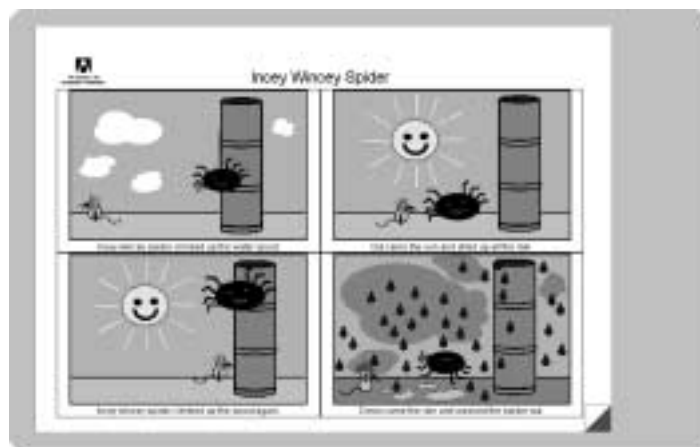
Early readers/writers or users with **specific learning difficulties** can use overlay keyboards to produce whole or part words and phrases, with a single keypress. This allows a student to practice sentence formation without having to worry about the spelling of individual words. Different overlays can be created to suit the current curricular topic. The *Concept Universal* overlay below is for use with the Wellington Square reading scheme.

Figure 5-5 *Wellington Square* overlay



Overlays are not limited to letters and words – anything can be drawn, printed or glued on the overlay. Non-readers can select photographs, pictures or symbols as well as, or instead of, text.

Figure 5-6 *Concept Plus* overlay



5.2 Choosing an Overlay Keyboard

Different keyboards are available in different sizes and with different features. Most keyboards need special software in which case you cannot consider the keyboard without also considering its accompanying software and the curriculum software that it needs to access. Software is discussed later on; we'll look at the 'basics' of the keyboards first.

Size

The size of the keyboard and overlay area is important:

Larger keyboards (e.g. A3 size) are useful for:

- group work where several children can use it at once;
- designing overlays with lots of keys, showing larger pictures and text;
- use by children who have difficulty targeting small keys.

The smaller keyboards may be more suitable for young children and those who have limited range of movement.

The British-made *Concept Keyboards* take A3 or A4 size overlays which are convenient for making up overlays since paper is readily available. The North American devices have different overlay sizes so you have to buy special paper from the keyboard suppliers or cut the overlay to shape.

Number of Individual Keys

The keys on most of the keyboards are approximately 1 or 2 cm square. This means the overlay picture areas are big and 'blocky' – fine for letters and word banks but not so good for detailed pictures or maps. *Informax* has 4096 individual keys so that very fine detailed overlays can be designed.

Computers, Connections & Keyguards

Different keyboards work with different computers and need different plugs and leads. These are described in more detail later. Keyguards are helpful for children who press keys by mistake (see *Chapter 3 Accessing the Keyboard* for more information about keyguards).

Cost

The prices given in the Table 5-1 are for the keyboard only. The *Concept* keyboards need software as well (see Table 5-2 for driver software prices).

Overlay Keyboards

'Concept' Keyboards

- **'Old blue' Concept Keyboard**

These keyboards were originally designed for the BBC micro in the early 1980s, and are still commonly used in schools. They have a flat ribbon cable which plugs into the User or Parallel port on BBCs. They can also be plugged into RM Nimbus 186, RM 386 'M' series and Acorn machines fitted with optional User Ports. The keyboards were available in A4 or A3 sizes with 128 keys. A large amount of good educational software was written for the Concept Keyboard, and much of it is still in use. The Concept Keyboards can also operate the more recent software written for *Concept Universal* boards.

- **Concept Universal**

The *Concept Universal* has been developed from the original old blue *Concept Keyboard*. They are available in A4 or A3 size, with 256 keys. They are supplied with one connecting cable for the computer of your choice: you can buy extra cables for other computers separately. The cables are either the parallel type (for plugging into BBC, Acorn or Nimbus User Port) or the serial type (for plugging into a PC 'COM' port, Acorn serial port, or Macintosh Printer/Modem ports). The keyboards have 'key beep' and 'auto-repeat' options.

- **Concept Universal Plus**

A new version of the Concept Universal with a more attractive and comfortable case. It has non-slip feet, holds overlays more securely, and has screw fixings for mounting. A version with an infra-red link, instead of the cable, is available. This keyboard can operate the same software as the standard Concept Universal.

- **Touch 'N' Go**

Touch 'N' Go is approximately A5 size (half A4), has 256 keys, and uses standard Concept Keyboard software. It connects to the computer with a cable or infra-red link.

- **Informatrix 2**

Informatrix is a 'high-resolution' version of the A3 Concept keyboard, with 4,096 keys instead of 256. More and smaller keys means you can design overlays with more accurate areas for detailed pictures and maps. The board can be used with the same overlays and software as the other A3 size boards (with up to 256 keys), but *Informax* software must be used if more than 256 keys are required. *Informatrix* uses the same serial cables as the *Concept Universal* to plug into Acorn, Macintosh or PC computers. It has key beep and auto-repeat options.

- **Keyguards and accessories**

Keyguards for A3 and A4 Concept Keyboards are available with 2, 4, 6, 12 and 32 holes. The *Concept Lynx* can give switch users access to concept keyboard software. It is a small box with four switch jack sockets; when a switch is pressed the software acts as though a key has been pressed on the Concept Keyboard.

- **Concept Keyboard software**

The *Concept keyboards* all need special *driver* or *emulator* software (such as *Informax*, *Concept Plus/Concept Plus Multimedia*, or *Conform+*) which recognises when a key has been pressed and then carries out the programmed operation on the computer. You can use the software to create your own overlays and programme the keyboard to work with particular applications. Most of the programs let you programme the keyboard to generate text, operate the control keys; move the mouse pointer; and play digitised sound. *Concept Plus Multimedia* is an extension to Concept Plus which lets you create multimedia activities, with recorded sound, synthesised speech and video clips, with matching overlays. Some educational software already has the Concept Keyboard driver built-in (such as *Writing with Symbols* and *Making Tracks to Literacy* from Widgeit, and some *My World* screens).

IntelliKeys

IntelliKeys has 576 keys and plugs into a Mac or PC keyboard connector in place of the standard keyboard; no special software is needed. It gives full control over the computer, including control over the mouse pointer and access to menus and dialogue boxes. It comes with seven ready made standard overlays: full QWERTY keyboard and mouse control; alphabetic; numeric; large mouse overlays; 'setup' for programming the keyboard response. It also has two 3.5mm jack sockets for switch users so can be used as a programmable switch interface. There are keyguards for the seven standard overlays and a range of keyguards for custom overlays, with 2, 3, 4, 6, 9, 12, 15 or 20 holes. There is a range of educational software which is supplied with ready-made overlays. You can buy ready-made software and overlays to access Edmark software such as *Bailey's Book House* and *Millie's Math House*. Custom overlay files and overlays for computer

control can be designed with a separate *Overlay Maker* program. *IntelliPics* is a multimedia program for creating early learning activities with sound and animation, and corresponding overlays, for access with IntelliKeys.

Key Largo / Ke:nx

Key Largo is an overlay keyboard for Macintosh. It needs a *Ke:nx* interface and software to work and the total cost of both is very high compared to other overlay keyboards. The keyboard is slightly larger than A4 and uses 'US legal' size overlays. The *Ke:nx* software provides full control over the Macintosh keyboard and mouse as well as digitised and synthetic speech. Many ready-made overlay files (called setups) are available for popular educational software packages.

Discover:Board / Ke:nx On:Board

Discover:Board (and the previous version *Ke:nx On:Board*) is an overlay keyboard that plugs into the Apple ADB keyboard/mouse port. It can be used with desktop computers or slides over an open Macintosh Powerbook and uses *Ke:nx* software to give full access to the Macintosh. Five overlays are supplied, with QWERTY, alphabetic, mouse control, numbers and multimedia layouts and new files and overlays can be made using the software supplied with the board. As well as good computer control, *Discover:Board* can be used to generate synthetic or digitised speech using the Mac's built-in sound software. Keyguards with 32, 64 and 128 holes are available. There are ready-made curriculum activities and overlays for popular educational CD's.

Others

The *Saitek PCDash* is a small overlay keyboard designed mainly for playing games on PC. It comes with ready-made overlays for games like *Quake*, plus one for controlling *MS Word* toolbars, and you can also design and print your own. It has 35 keys on the overlay, an eight-way 'game-pad'; 2 fire buttons, and 3 programmable buttons. It is £49.95, from KCS and some computer suppliers.

Electrone manufacture a range of overlay keyboards ('*Keyport Touch Panels*') with 60 to 300 keys, for industrial, sales and healthcare applications. They are slightly larger than A4 size and are user programmable. They cost between £125 and £349.

Table 5-1 Overlay Keyboards

Overlay Keyboard	Overall size cm	Overlay size cm	No. of keys	Connects to...	Keyguard & price	Price Guide	Supplier
Acorn, BBC, Mac, Nimbus, PC Concept Universal A3 (A4)	52 x 33 (39 x 24)	42 x 30 (30 x 21)	256 - 16x16	Parallel or serial port	2, 4, 6, 12, 32 holes, £25 each	£109	SEMERC, Inclusive Technology, Concept Keyboard Co.
Acorn, BBC, Mac, Nimbus, PC Concept Universal Plus A3 (A4)	52 x 33 (39 x 24)	42 x 30 (30 x 21)	256 - 16x16	Parallel or serial port. Infra-red serial link	2, 4, 6, 12, 32 holes, £25 each	£129 (£177 for infra-red)	SEMERC, Inclusive Technology, Concept Keyboard Co.
Acorn, BBC, Mac, Nimbus, PC Touch 'N' Go	28 x 10	24 x 16	256 - 16x16	Serial cable or Infra-red serial link	-	£169 (£199 for infra-red)	Concept Keyboard Co.
Acorn, PC Informatrix 2	39 x 24	42 x 30 (A3)	4096 (64x64)	Serial port	2, 4, 6, 12, 32 holes, £25 each	£129	SEMERC
Mac, PC IntelliKeys	44 x 26	33 x 22	576 (24x24)	Keyboard port	14 different types, £25 to £39 each	£239	KCS, SEMERC, Inclusive Technology

Overlay Keyboard	Overall size cm	Overlay size cm	No. of keys	Connects to...	Keyguard & price	Price Guide	Supplier
MAC Discover:Board	39 x 29	36 x 22 (US legal)	128 (16x8)	ADB keyboard port	128, 64, 32 holes, £75 each	£395	Don Johnston
MAC Key Largo	41 x 30	36 x 22 (US legal)	128 (16x8)	Ke:nx interface	128, 64, 32 holes, £75 each	£215 + £554 for Ke:nx interface	Don Johnston

Overlay Keyboard Software

Most of the overlay keyboards need software in the computer to make them work:

- **Keyboard Drivers & Editors.** The *keyboard driver* software recognises when a key on the overlay keyboard is pressed and then inserts text, moves the mouse, or performs some other operation on the computer. (*IntelliKeys* is an exception – it plugs straight into the computer and can be used immediately.)
- **Overlay File.** The keyboard driver needs an *overlay file* (also called selection set or setup) which defines what each key does when pressed. Different overlay files are used for different programs and different purposes.
- **Overlay Editor.** Overlay files are created using an *overlay editor* program. Most overlay designer programs can also print out a paper overlay to match the overlay file.

Accessing Curriculum Software

There are several categories of educational software which are accessible with an overlay keyboard:

- **Specifically designed software** with driver for an overlay keyboard built in. Overlay files and matching paper overlays are supplied with the program. Everything is supplied ready to use so no programming is required. However, you are usually stuck with the overlays and activities offered by the program and the content is generally fixed. *ClarisWorks* templates, some *My World* support packs, *Discover Curriculum Overlays* and the *IntelliKeys Hands-on* programs are examples of programs designed for overlay keyboards. Space does not permit a full listing of all the programs that have an option of overlay keyboard access – see the *MicroScope Concept Keyboard Special* issue and catalogues from the suppliers listed at the back of the book for reviews and programs.
- **Content free** software with optional overlay keyboard access. Usually a ‘starter set’ of overlay files and overlays are supplied with an overlay editor. The *Full-Phase+2* word processor from SEMERC is one example.
- **Keyboard drivers/emulators** let you use the keyboard with *any* program running on the computer. Once a suitable overlay file is created the driver program operates the computer as though the ordinary keyboard or mouse were being used. These programs have considerable flexibility and they are particularly useful in integrated settings where the overlay keyboard user can get access to the same software that is being used by the rest of class. Creating overlays files and overlays for individual pupils and curriculum tasks is time-consuming, although most programs come with a selection of ready-made files and overlays.

Overlay keyboard Software Features

Price and supplier details of overlay keyboards are listed in Table 5-2; Table 5-3 gives the features of each program:

- **Text.** All the programs can insert text into an application on the computer.
- **Control, Modifier and Cursor keys.** All can generate control key combinations – for example, pressing ‘b-P’ to print a document.

- **Sticky Keys.** Most programs have *Sticky Keys* for people who cannot hold down two keys at once: the Shift or Control key is pressed first, then a letter key pressed next (see *Chapter 3 Accessing the Keyboard* for a full description of sticky keys).
- **Mouse Pointer Control.** Control of the mouse pointer is a very useful feature as many pupils who have difficulty with a standard keyboard also have problems with a mouse.
- **Auditory Feedback.** The keys on an overlay keyboard do not move or click when pressed so there is little feedback that a key has actually been activated. Most keyboards or programs give an auditory beep to confirm when a key is pressed. This is helpful for users with visual impairments, learning difficulties, or physical access problems.
- **Digitised sound.** Some programs let you use the keyboard to play back digitised recordings or sound or speech.
- **Speech Output.** Programs which can generate synthetic speech, instead of, or as well as, text can be useful to support literacy and writing or for interpersonal communication.
- **Keyboard Response.** Sometimes it is important to be able to adjust the response of the keyboard (see *Chapter 3 Accessing the Keyboard* for a description of the various adjustments), so the table shows which facilities are offered with each program.
- **Print-out Overlay.** Programs with facilities for creating and printing paper overlays ready to be used with new overlay files can save considerable time and effort.

Table 5-2 Overlay Keyboard drivers

DRIVER SOFTWARE	Overlay Keyboard	Comment	Price Guide	Supplier
Acorn, Windows PC Informax	Concept Keyboards	Flexible software with good emulation features.	£29 (free or £4 if bought with board)	SEMERC, Inclusive Technology
Mac Intercept	Concept Keyboards	Similar to Designer, but has multiple 'layers' e.g. lower & upper case	£30	Concept Keyboard Co.
Windows PC Concept Plus	Concept Keyboards	For making and printing overlay files and overlays.	£60 (£14 if bought with board)	AU Enterprises
Windows PC Concept Plus Multimedia	Concept Keyboards	Concept Plus with sound, speech, video and a multimedia presentation program	£95	AU Enterprises
Mac, Windows PC Intellikeys	Intellikeys	Authoring program for designing multimedia activities and matching overlays	free with keyboard (£239)	KCS, Semerc, Inclusive Technology
Mac, Windows PC Overlay Maker	Intellikeys	Software for making custom overlays for IntelliKeys.	£49	KCS, Semerc, Inclusive Technology
Mac, Windows PC IntelliPics	Intellikeys	Software for creating multimedia activities for IntelliKeys keyboard	£75	KCS, Semerc, Inclusive Technology
Mac Discover/ Ke:nx	Discover:Board Ke:nx On:Board Key Largo	Very comprehensive emulation and speech output features	Supplied with board (boards from £350)	Don Johnston

Refer to the suppliers' catalogues for further details

Table 5-3 Overlay Keyboard driver software features

DRIVER SOFTWARE	Overlay Keyboard	Text	Control, Modifier & Cursor Keys	Mouse Control	Input Acceptance Filter	Post Acceptance Filter	Repeat Filter	Sticky Keys	Auditory Feedback	Digitised sound output	Speech output	Print-out Overlay
BBC BBC Concept	Concept Keyboards	✓	✓									
Acorn Conform+	Concept Keyboards	✓	✓					✓	✓			✓
Acorn, Windows PC Informax	Concept Keyboards	✓	✓	✓			✓	✓	✓			✓
Mac Intercept	Concept Keyboards	✓			✓		✓		✓			
Windows PC Concept Plus	Concept Keyboards	✓	✓	✓			✓		✓	✓	✓	✓
Windows PC Concept Plus Multimedia	Concept Keyboards	✓	✓	✓			✓		✓	✓	✓	✓
Mac, PC Intellikeys	Intellikeys	✓	✓	✓	✓	✓	✓	✓	✓			
Mac, PC Overlay Maker	Intellikeys	✓	✓	✓	✓	✓	✓	✓	✓			✓
Mac Ke:nx	Key Largo, Discover:Board Ke:nx On:Board	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓

Which overlay keyboard is best?

To choose an overlay keyboard you have to specify the functions needed by the user, the curriculum and learning tasks, and then select the most appropriate combination of hardware and software. Cost, the computer and software that you want to use, and the ease of use of the keyboard and software are also key issues.

- **Acorn**

The most popular overlay keyboards for Acorn RiscOS computers are the *Concept* Keyboards with either *Informax* or *Conform+* software. If you wanted to create overlays for detailed pictures or maps then the *Informatrix* with 4096 keys, with *Informax* software, would be the best choice.

It is possible to plug in the *IntelliKeys* device into A7000 or RiscPC machines as they have 'PS/2' keyboard connectors, but you can only use the standard overlays – the *OverlayMaker* software does not run on Acorn RiscOS.

- **Macintosh**

If you were working on a particular curriculum topic and using a program like *ClarisWorks Templates* on a Mac, then the *Concept Universal* might be most suitable as the Templates are supplied with ready-made overlays, and the keyboard itself is cheap.

But if you wanted an overlay keyboard to work with *all* programs on the Mac, and replace all the functions of the standard Macintosh keyboard and mouse, you might choose *Intellikeys* or *Discover:Board* in preference to the *Concept Keyboards* with *Intercept* software, because the latter

has very limited features (it does not let you control the mouse pointer, for example).

Discover:Board has a more sophisticated set of computer control functions than *IntelliKeys*, while *IntelliKeys* has better tools for designing overlays and associated activities (eg. *IntelliPics & OverlayMaker*). Therefore, *Discover:Board* may be a better choice if you want a keyboard to give the user independent control over the computer and easy access to common programs; while *IntelliKeys* has the advantage for creating your own educational activities.

- **Windows PC**

A *Concept Keyboard* with *Informax* or *Concept Plus* software gives good computer control at a low price. The infra-red versions of the *Concept Universal Plus* and *Touch 'N' Go* are good choices for wheelchair users because no connecting cable is needed.

IntelliKeys has more facilities and features (switch sockets; better control over keyboard response), but at a higher cost.

5.3 Further Information

Web Sites

Concept Keyboard Company <http://www.conceptkey.co.uk> The Concept Keyboard and accessories site.

Don Johnston Inc. <http://www.donjohnston.com/> Information about Discover:Board and other Don Johnston products.

Inclusive Technology <http://www.inclusive.co.uk/default.htm> An excellent practical introduction to the range of alternative keyboards and pointing devices available.

Intellitools <http://www.intellitools.com/> - The IntelliKeys site, with downloadable resources for Intellikeys.

Suppliers

AU Enterprises Ltd, 126 Great North Road, Hertfordshire AL9 5JZ, Tel 01707 266714

Concept Keyboard Company, 9 Murrills Estate, Portchester, Hampshire PO16 9RD Tel. 01705 372233

Don Johnston, 18 Clarendon Court, Calver Road, Winwick Quay, Warrington WA2 8QP. Tel: 01925 241642.

Inclusive Technology, Saddleworth Business Centre, Huddersfield Road, Oldham OL3 5DF, Tel. 01457 819790.

KCS, PO Box 700, Southampton SO17 1LQ. Tel. 01703 584314.

Resource, 51 High Street, Kegworth, Derby DE74 2DA, Tel. 01509 672222.

Semerc 1 Broadbent Road, Watersheddings, Oldham OL1 4LB, Tel. 0161 627 2381.

References

Taylor, Jennifer (1995) *MAPE Concept Keyboard Special 1995*, **Microscope** Spring 1995.